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1931

Biology of the popular magazines.

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THESIS

THE BIOLOGY OF THE POPULAR MAGAZINES

Submitted

by

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(B. S., Tufts, 1925)

In partial fulfillment of requirements for the degree of Master of Education

1931

Boston University
School of Education
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THE BIOLOGY OF THE POPULAR MAGAZINES

Chapter I.

Introduction

Biology is often defined as the science of living organisms or the science of life. The Americana [1] elaborates as follows:

> "Biology strives to discover the principles which unify it, the processes by which living things have developed, the nature of life itself and the future in store for it. Biology is the sum of all the special departments of study which deal with plants and animals and with man in his relations to animals and plants."

The value of biology as a secondary-school subject is gaining increasing recognition.

To quote Professor Hill [2]: "During the last quarter of a century, it has gradually been realized that biological science no less than physical science has an important role to play in the

1 The Americana, 1928 Edition, Americana Corporation, New York. p. 720

2 Hill, A. V. "Biology in Education and Human Life"- Nature, Jan. 3, 1931. p. A4

affairs of humans."

Professor Thomson [1] says: "The post-war period has been marked by a growing discernment of the practical value - indeed indispensability - of biology as a guide in the control and amelioration of human life."

What are the values or objectives of a general biology course for high school pupils less than ten per cent of whom, according to Koos [2], will continue its study? And what subject matter of this wide field will best serve toward the attainment of these objectives? Kinsey [3] appropriately remarks: "We have the resources of the world. Whereupon - do we thrust their noses into dead cats and dried fungi."

At the outset of this study, for the purposes of introduction and later comparison, it is interesting to note the following opinions:

Ballew [4] - "The high school curriculum is constantly being revised in an effort to adjust it

1 Thomson, J. A. "Twelve Years' Progress in Biology"- Discovery, April, 1931. p. 107

2 Varrelman, A. "On Teaching Living Biology" - Sch., Sci. And Math., March, 1931. p. 274

3 Kinsey, A. C. "The Content of the Biology Course"- Sch., Sci. and Math., April, 1930. p. 375

4 Ballew, Amer M. "Evolution, Heredity and Eugenics in High School Biology" - Sch., Sci. and Math., April, 1929. p. 353

to the changing conceptions of education. We recognize today that the subject matter taught must have a social significance; that it must relate itself in a very definite way to the problems encountered in the civic life of an individual. -

"A survey of the biological sciences as they are taught will show that these aims are not always recognized. Quite often some of the more social aspects of the subject are practically ignored."

Kinsey [1] remarks on the uncertainty of teachers regarding choice of biology subject-matter and says that the solution may lie in redefining objectives and re-evaluating future needs. He suggests two objectives: 1) to interest the student in his world; 2) to equip him with scientific method for interpreting the world.

Varrelman [2] believes that general biology courses should contain "more old-fashioned natural history, more knowledge of plants and animals and less of their detailed insides"; that a general biology course "should be taught as an end in itself".

Professor L. H. Bally who is to offer a course in biology methods at Northeastern State Teachers' College

1 Kinsey, A. C. "The Content of the Biology Course" - Sch., Sci. and Math., April, 1930. p. 374

2 Varrelman, A. "On Teaching Living Biology" - Sch., Sci. and Math., March, 1931. p. 273

this summer (1931) lists the following aims of secondary-school biology [1]:

1) "To give the pupils information concerning the various life activities of plants, animals and human beings and their inter-relationship and interdependence.

2) "To give the pupils joy through appreciation of nature's wonders, beauties and adaptations and to provide interests for leisure time.

3) "To train pupils in the habits of scientific observation and accuracy of thought.

4) "To insure efficient instruction in personal and community health problems.

5) "To inspire the pupil to humanitarian service through the biographies of those biologists who have made contributions to man as an individual and to civilization as a whole.

6) "To teach the laws of heredity as applied to plants and animals and their application to parenthood.

7) "To show the pupil by adaptations of plants and animals how he can adapt himself to the varying conditions of life.

8) "To study the biological principles concerned in the economic welfare of mankind. Pest and insect control.

1 "Methods in the Teaching of Biology" - Turtox News, June, 1931. p. 43

9) "To better our conditions by conserving what nature has given us.

10) "To give a working vocabulary, thus enabling the pupil to appreciate and enjoy the articles in current literature dealing with the subject of biology.

11) "To study the principles of biology as applied to many of the industries, specifically applying to vocational guidance and vocational training.

12) "To present such a view of creation as to strengthen the pupil's faith of the Creator."

From the preceding discussion, we may conclude that certain biological understanding is vital to the welfare of the human animal, and that the fundamental aim of the general biology course should be "to make life more worth living". Choice of objectives and subject matter varies widely. Some teachers lose sight of the goal; some take the wrong subject-matter route; and some choose inefficient method-vehicles. The general-biology teacher, in particular, should constantly check on his work - measure it by various criteria - ask himself, "Am I making life more worth living or am I killing a very live subject?"

What criteria can be used? The opinion of the

expert in the form of the many excellent texts and outlines is invaluable - is, in fact, fundamental. But, nevertheless, this circle of opinion is a bit too exclusive. In striving to meet the needs of average people, why not consider the opinions of such people along with those of the specialist?

Through what channels can we gain the opinion of the public regarding its educational needs in the biological field? Numerous methods present themselves; but for this survey, I have chosen one approach to the public, the non-fiction articles of the popular magazine. In the non-biological as well as the biological articles, we discover what biological material (terms, principles, et cetera) the public needs a working knowledge of. From a study of the scientific articles, we discover what biological subject matter people voluntarily read and what objectives the authors hold to when writing under more direct stimulus from public demand than in the case of textbook-pupil situations.

The findings of this survey of the biology of the popular magazine are offered as one criterion against which general biology objectives and content may be checked; and it is hoped that some small benefits may accrue therefrom.

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Chapter II.

Scope and General Method

This survey of the biology of the popular magazine is based on the non-fiction articles of three issues each of the twelve magazines having the greatest total distributions. According to Editor and Publisher for 1931[1], these in the order of their total distributions are: Saturday Evening Post, Woman's Home Companion, Ladies' Home Journal, Pictorial Review, McCall's Magazine, Liberty, Delineator, The American Magazine, Collier's, Good Housekeeping, Cosmopolitan and Literary Digest. Table I., page 8., gives a classified list of these magazines with their total distributions.

For a cross-section of material, the issues of March, April and May 1931 of the eight monthly magazines and three May, 1931 issues of each of the four weekly publications, an aggregate of thirty-six magazines, were used.

The non-fiction articles were read and all those containing any biological terms or references are recorded in the list to be found in the Appendix. In this list, the fourteen hundred and fifty-eight terms

1 Editor and Publisher for Jan. 31, 1931. pp. 126-130

Table I.

Total Distributions of the Twelve Leading Magazines [1]

Leading Magazines	Total Distribution
Weekly:	
Saturday Evening Post	2, 932, 190
Liberty	2, 419, 003
Collier's	2, 268, 575
Literary Digest	1, 609, 410
Monthly:	
The American Magazine	2, 315, 077
Cosmopolitan	1, 628, 319
Women's:	
Woman's Home Companion	2, 646, 612
Ladies' Home Journal	2, 595, 720
Pictorial Review	2, 518, 953
McCall's Magazine	2, 509, 459
Delineator	2, 327, 343
Good Housekeeping	1, 799, 296

1 In Jan., 1931, according to Editor and Publisher, see page 7

obtained are alphabeticized under their article- and magazine-sources respectively.

The non-fiction articles number one hundred and fifty-two, fifty-three of these being non-biological and ninety-nine biological in nature. Samples of this data are given on page 10. For the entire list, see the Appendix.

The nature of the material has prompted study from three points of view: The Objectives and General Topics of the Popular Magazine's Biological Articles and Their Applicability to the General Biology Course, Chapter III.; Biological Terminology and Subject Matter of the Popular Magazine's Non-Fiction Articles, Chapter IV.; and School Use of the Popular Magazine's Biological Articles, Chapter V.

Samples of Biological Terms of Appendix List:

Liberty

May 30, 1931

St. Johns, Adela Rogers "Lon Chaney", p. 36

bird house	heart	tonsils
blood transfusion	infection	trout
death	lungs	Walton, Izaak
headaches	spine	

(non-biological)

The Saturday Evening Post

May 16, 1931

Hall, Wilbur "Amateur Plant Breeding" (from unpublished manuscripts and notes left by Luther Burbank), p. 141

bees	plant breeding
beetles	pollen
composites	pistils
cross-pollination	seed envelopes
fertility	stamens
hand-pollinating	variant
heredity	variation
hybrids	variety
natural pollination	weeds
organs	

(biological)

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Chapter III.

The Objectives and General Topics of the Popular Magazine's Biological Articles and Their Applicability to the General Biology Course

This portion of the study is based on the ninety-nine biological articles under consideration. An attempt to determine the purposes of the articles and the general topics which were considered by the authors as conducive to the realization of these purposes resulted in the data of Table II., page 19.

Here are listed the resulting nine purposes, or - in school vocabulary - objectives, with a frequency column indicating the number of articles in which each objective occurred. As several of the articles are written around more than one objective, there is some duplication in the frequency column. Under each objective are listed the main topics.

Consideration of the material of this table should show its practicability - that it relates itself "in a very definite way to the problems encountered in the civic life of an individual" [1]. And, while there is no pretense at claiming that all subject-matter

1 See page 2

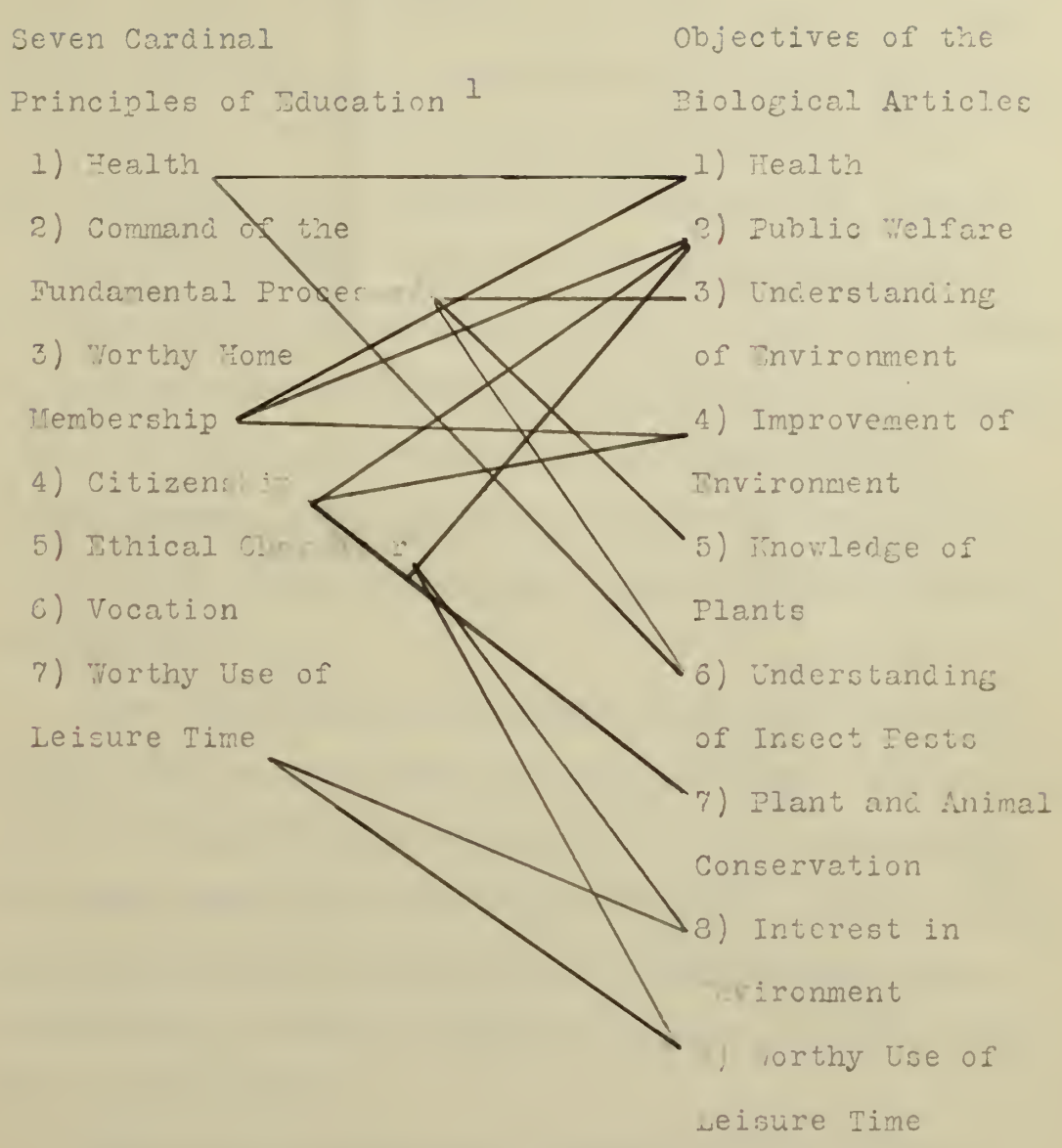
suggested by the biological articles of the popular magazine is the best choice for the general biology course, it is contended that Table II. and other compilations from similar sources should prove of value to the teacher or outline-maker for purposes of comparison with biology-course objectives and topics. To the person who is open-minded, suggestions regarding adoption, discontinuation or revision of material toward the aim of making life more worth living must present themselves.

Some verification of the value of the objectives may be gained through comparison with the seven cardinal principles of education, as shown by Figure I. on page 13.

It will be seen by this diagram that the nine objectives readily fit into six of the cardinal principles; none of the articles evidenced vocational objectives. But from several, notably numbers 16, 61, 71, 75, 136 and 151, suggestions on choice of vocations might be indirectly gained. And, it is sometimes claimed that the general biology course should not make any serious attempts at assuming responsibility for vocational education.

It is interesting to note that more than half of the biological articles were written on the subject of

Figure I.



1 Bureau of Education Bulletin, No. 35, Washington, 1918. p.32

health; an examination of additional issues of the same magazines for different seasons of the year leads to the conviction that practically the same proportion would hold in a study covering any length of time. One is prompted to consider for a moment what proportion of the general biology course should be devoted to this part of the subject. Kinsey [1] says that there is a tendency to overemphasize hygiene in biology-teaching. This material must not be confused with mere school hygiene. It comprises subject matter from at least three phases of biology - physiology, hygiene and sanitation.

Some unsynthesized biology courses give one third of the time to physiology and health study. Factors such as requirements, other courses in the curriculum, and local needs all have their influence. I have found through personal interview that student-bodies value physiology with health applications more than any other part of the subject.

Moon in his Biology for Beginners [2], one of the outstanding unsynthesized secondary-school biology

1 Kinsey, A. C. "The Content of the Biology Course" - Sch., Sci. and Math., April, 1930. p. 376

2 Moon, Truman Biology for Beginners, Revised Edition, 1926. Henry Holt and Co., New York pp. 20-29, 377-499, 591-607, 638-647

texts, devotes approximately one hundred fifty-seven pages of the entire six hundred forty-seven to this part of the subject.

The objective next highest in the frequency column is number 5., an understanding of how to raise and care for plants and a knowledge of common varieties of cultivated flowers, bulbs, vines and shrubs. This very practical aim is not parallelled in the usual biology-teaching. It is possible and too often probable that the pupil in the average biology class will make detailed studies of unfamiliar plants, memorize - under pressure - certain terminology, even take field trips,-- and finish the course, forget the terms, possess no greater appreciative understanding of plant life, and have no knowledge of their care or ability to recognize cultivated or wild plants. Should we not, if only by means of marginal units, do more of this practical teaching?

The sub-science of botany often suffers from the student's dislike of it; is it nor possible that the objectives need some revision - that, in this part of biology more than elsewhere, we are teaching "the science of life with the life left out"?

Sufficient space was given to our insect-competitors to warrant a separate objective, number 9., understanding of the common insect-pests and knowledge of

their control. Here the emphasis is wholly practical.

The values of the remaining objectives are self-evident. Special notice is called to numbers 6. and 7.

Under the general objectives are listed the main topics of the authors. Some of them are not suitable for school consideration; to test out the value of the remainder, measure them up to the standard of necessity or helpfulness to effective living. Many of these topics are included in general biology courses; but are they so taught that the understandings and methods, which the pupils are exposed to, turn into permanent abilities and attitudes? Some of the reasons why the real, permanent values of the biology subject so often fail to accrue to the pupil may be:

1) The teacher's failure to recognize these values
2) Improper choice of subject matter
3) Lack of organization
4) Lack of emphasis
5) Too involved with other, non-essential material
6) Lack of time
7) Lack of making practical applications

For a comparison study of the biology topics of the magazine and those of the general biology text, the quite-comprehensive general text, Biology for

Beginners by Truman Moon [1] has been chosen. Whenever there has been any pertinent allusion in this text to a topic of Table II., the letter of that topic has been underlined. This study shows a considerable correlation of material, but no evidence of the degree to which the topic is taken up. And, as usual, the burden falls on the intelligence of the teacher. A book is a helpful, necessary tool; but the teacher must weigh, organize, apply and carry on with his material until he knows that the desired understandings, abilities, habits and attitudes are fixed.

Certain subjects included in Table II., are sufficiently important to deserve sections by themselves in the biology outline instead of appearing incidentally in subordination to other subjects and thus losing organization and emphasis. A few of these under Objective 1) are topics H, J, K, P, Q, R, T, U and V. Topic V is a unique one and worthy of adoption. It would include information on nearby clinics, hospitals, where to go for various medical needs, and the nominal rates. Under Objective 7), Topic C is noteworthy, the urge to improve one's mental as well as physical condition during vacation-time; and information on nearby national and state parks and other available vacation grounds.

1 See page 14, footnote 2

Here is a real attempt toward the objective, Worthy Use of Leisure Time. It may be of interest to the reader to know that Benjamin Sanborn and Company publish two children's books, Our National Parks by N. Rolfe.

One might continue indicating topics of value; but the biology instructor will see for himself wherein he can derive benefit from this table.

Table II.

Objectives and General Topics of the Biological Articles Under Consideration

	Frequency of occurrence
1) Health protection and health-building	52
A. Basic understanding of how the human body functions	
B. The effects of poor posture on health	
C. Knowledge of the food-needs of the body and right eating habits	
D. The body's need of iron	
E. Milk as a food	
F. Eggs	
G. Sugars	
H. Food standards	
I. The effects of alcohol on the system	
J. Knowledge of the effects of the common drugs	
K. Anaesthetics	
L. Blood transfusion	
M. Relaxation - the need; how to relax	

Table II. (cont.)

	Frequency of occurrence
N. Care of the skin	
O. The needs of the teeth	
P. Understanding of the causes of common non-contagious diseases	
Q. Contagion - how it spreads and its control	
R. Types of immunization	
S. Prevention of tuberculosis by inoculation	
T. Common colds	
U. Sanitation	
V. Knowledge of available medical treatment and how to obtain it	
2) Public welfare (Considerable duplication with other objectives)	14
A. Understanding that certain diseases, mental deficiencies and forms of insanity are inherited and how society can improve conditions	
B. Epidemics and their control	

Table II. (cont.)

	Frequency of occurrence
3) Understanding of the environment	8
A. Interdependence of animals, plants and the inorganic	
B. Knowledge of plant-needs	
C. Sexual reproduction in flowering plants	
D. Wild animal habits	
E. Bird life	
F. Evolution	
4) Improvement of environment	19
A. Encouragement to plant bulbs, vines and shrubs	
B. Garden color combinations	
C. Planting for continuous bloom	
D. Pruning	
E. Providing a community with plant-cuttings	
F. The bulletin- board menace	
5) Understanding of how to raise and care for plants and a knowledge of common varieties of cultivated flowers, bulbs, vines and shrubs	20

Table II. (cont.)

	Frequency of occurrence
A. Seed-planting	
B. Transplanting	
C. Soil requirements	
D. Use of cold-frames and hot-beds	
E. Propagating by cuttings	
F. Pruning	
G. Plant pests and diseases	
H. Weeds	
I. Bulbs	
J. Irises	
K. Ferns	
L. Climbing roses	
M. Cultivated flowers	
N. Old-fashioned flower gardens	
O. Kitchen gardens	
P. Herb gardens	
Q. Rock gardens	
6) Interest in environment	8
A. Cultivation of habits of observation and appreciation of nature	
B. Bird habits	
C. Wild flowers	

Table II. (cont.)

	Frequency of occurrence
D. Desert gardens	
E. Rock gardens	
7) Worthy use of leisure time	10
A. Amateur plant-breeding	
B. Garden experimentation	
C. Vacationing	
(1) need to make vacation-time worth while	
(2) knowledge of available vacation-grounds - state and national parks	
8) Plant and animal conservation	5
A. Forest conservation	
B. Forest reserves	
C. Fish and game commission	
D. Game preserves	
E. Bird reservations	
9) Understanding of common insect-pests and knowledge of their means of control	7
A. Clothes moth	

Table II. (cont.)

	Frequency of occurrence
B. Insect house-pests	
C. Plant pests	
D. Insect disease-carriers and their prevention	

Chapter IV.

Biological Terminology and Subject Matter of the Popular Magazine's Non-Fiction Articles

This section of the study is based on Table III., which is a classified frequency list of biological terms found in the non-fiction articles of the popular magazines employed in this study [1]. For the original list, see Appendix.

Considering the source of this material we can readily see that Table III. is a sample of the biological subject matter which people consider in everyday life; and we also see that it is couched in practical terms. If the general biology course purposes to effect the development of the most effective understandings, abilities, habits and attitudes toward the end ofmaking life more worth while that it is capable of, it must choose from its broad field the subject matter which most concerns people and put it in practical terms. Therefore, this table is offered as one practical criterion to use in making that choice.

The following terms showed the greatest frequencies, probably indicating importance of, more difficulty with, or greater interest in these subjects and

1 See Chapter II.

consequent need of teaching emphasis:

bones	nerves	colds
muscles	decay	energy
stomach	infection	vitamines
blood	bacteria	seeds
heart	fatigue	flowers
brain	nervousness	

In the human biology section, the following topics received greatest consideration:

Nutrition	Nervous System
Blood Circulation	Disease
Respiration	Health Protection

Observations from many points of view could be stimulated by a further study of this table; but the real value lies in the use the teacher can make of it.

Table III.

Classified Frequency Table of the Biological Terms Found in the Non-Fiction Articles of the Popular Magazines Under Consideration

	Frequency of occurrence
The Human Body	1
Body functions	2
The human system	1
Organism	5
organs	4
tissues	3
cells	3
Anatomy	1
Physiology	1
Chest	1
Abdomen	6
Growth	6
Decay	10
Death	4
Body ailments	2
Fatigue	7
Pain	3
Inflammation	2

Table III. (cont.)

	Frequency of occurrence
The Skeletal System	2
Bone	11
Skeleton	3
Vertebrae	2
Skull	3
Collar bone	1
Pelvis	1
Dislocation	1
Fracture	2
Osteopath	1
Chiropractor	1
The Muscular System	1
Muscles	9
Muscular	3
Voluntary muscle	1
Involuntary muscle	1
Sinew	1
Facial muscles	1
Biceps	1
Lifting muscles	1
Good posture	2

Table III. (cont.)

	Frequency of occurrence
Nutrition	4
Nutrients	6
Proteins	3
albumin	1
high-protein diet	1
low-protein diet	1
Energy-foods	1
carbohydrates	3
starches	2
beet sugar	1
cane sugar	1
corn sugar	1
dextrose	1
lactose	1
sucrose	1
cellulose	1
fats	4
Vitamines	9
Vitamin A	7
rickets	4
Vitamin B	4
beri-beri	1
Vitamin C	4
scurvy	3

Table III. (cont.)

	Frequency of occurrence
Vitamin D	4
Vitamin F	1
Vitamin G	1
Vitamin H	1
Minerals	4
Calcium	3
Iron	3
Phosphorus	2
Diet	6
Calories	6
high-calory diet	1
low-calory diet	1
Malnutrition	15
Roughage	1
The food standards	1
Food and Drugs Act	1
Government Inspection of meats	1
Digestive system	2
Digestion	5
Digestive fluids	3
Mucous membrane	2
Teeth	4
wisdom tooth	1
tooth decay	1

Table III. (cont.)

	Frequency of occurrence
caries	1
pyorrhea	1
dental hygienists	1
Tongue	3
Stomach	8
gastric	2
hydrochloric acid of stomach	1
acidity	1
Intestines	1
liver	5
bile	1
gall bladder	1
gall stones	1
pancreas	1
insulin	1
diabetes	4
insulin treatment	1
alkalinity	2
Colon	1
Intestinal bacteria	1
Assimilation	2
Energy	15
Growth	3

Table III. (cont.)

	Frequency of occurrence
Body temperature	2
"Cold-blooded"	1
Fever	6
Digestive disturbances and	1
Gastro-intestinal diseases	1
Indigestion	8
Auto-intoxication	2
Diarrhea	2
Dysentery	2
"Ptosis"	1
The Blood Circulation	1
Circulatory system	1
Blood	14
red blood cells	1
hemoglobin	1
isoagglutinin	1
coagulation	1
blood test	1
blood transfusion	2
Heart	10
cardiac	1
pulse	1

Table III. (cont.)

	Frequency of occurrence
electrocardiograph	1
heart diseases	2
Blood vessels	2
arteries	2
arterial blood	1
capillaries	1
veins	4
varicose veins	1
blood pressure	4
Lymph	2
Anaemia	3
Apoplexy	1
Fainting	1
Respiratory System	1
Breathing	5
Mouth-breathing	1
Adenoids	5
Tonsils	4
Diseased tonsils	1
Nose and throat membranes	1
Windpipe	1
Larynx	1
vocal cords	1
laryngitis	3

Table III. (cont.)

	Frequency of occurrence
Lungs	1
Oxygen	3
Asthma	4
Coughs	2
Croup	1
Catarrhal croup	1
Membranous croup	1
Hay fever	1
Infections of the respiratory tract	2
Bronchitis	3
Colds	3
Consumption	1
Diphtheria	5
Influenza	1
Pharyngitis	1
Pneumonia	6
Septic sore throat	1
Tonsilitis	1
Tuberculosis	5
The Skin	2
Cutaneous	2

Table III. (cont.)

	Frequency of occurrence
Functioning of the skin	1
Pores	1
perspiration	1
Sebaceous glands	1
hair follicles	1
Scalp	1
Acne	1
Boils	1
Pus	1
Elimination	1
Waste products	2
Perspiration	1
Kidneys	1
The Nervous System	3
Nerves	10
Senses	1
stimuli	1
Instincts	7
Spine	6
Reflex actions	2

Table III. (cont.)

	Frequency of occurrence
Brain	14
Mind	5
reasoning area	1
Eyes	2
Eye strain	1
Astigmatism	1
Deafness	1
Mastoids	1
Nervousness	9
Neurosis	1
neurotic	2
Neurasthenia	2
Neurologist	1
Mental defectives	2
Feeble-minded	2
Insanity	1
Paranoia	1
Psychiatrist	1
Neuritis	1
Meningitis	1
Paralysis	1
Delirium	1
Headache	2

Table III. (cont.)

	Frequency of occurrence
Glands	2
Ductless glands	1
Thyroid glands	2
goiter	2
Pituitary gland	1
Reproduction	2
Propagation	3
Adolescence	5
Puberty	1
Germs	13
Bacteria	2
Bacteriological	1
Bacteriologists	1
Cultures	1
Bacilli	1
Tubercle bacilli	1
Streptococci	1
Infection	10
Foci of infection	2
Toxins	5
Abscesses	3
Acne	1

Table III. (cont.)

	Frequency of occurrence
Boils	1
Carbuncles	1
Erysipelas	1
Ulcers	3
Sinus infections	1
Disease	4
Epidemic	1
Chronic disease	3
Malady	1
Malignant	1
Infectious diseases	3
Contagious diseases	5
Chicken pox	2
German measles	1
Influenza	5
Malaria	2
Measles	6
Mumps	2
Scarlet fever	4
Small pox	6
Syphilis	1
Typhoid fever	6
Typhus fever	1

Table III. (cont.)

	Frequency of occurrence
Yellow fever	2
Cancer	1
Tumor	1
Rheumatism	1
Pathologist	1
Therapeutic	1
Health Protection	2
Body resistance	3
Lack of resistance	2
Good posture	3
Ultra-violet rays	3
Milk-borne diseases	1
Pasteurized milk	2
Inspected milk	1
Water pollution	1
Pure water	1
Septic tanks	1
Flies	2
Sanitation	2
Antiseptic	3
Disinfectant	2

Table III. (cont.)

	Frequency of occurrence
Sterilization	2
Pasteurized	1
Unpasteurized	1
Immunity	1
Immune	4
Immunization	3
Natural immunity	1
Inherited immunity	1
Acquired immunity	1
inoculation	5
serum	1.
toxin-antitoxin	5
vaccination	4
vaccine	2
tuberculosis vaccine	1
Schick test	2
Dick test	1
virus	1
virulent	1
Health service	1
Clinics	1
First aid	2

Table III. (cont.)

	Frequency of occurrence
Drugs, Stimulants and Narcotics	6
Anaesthetic	2
Spinal anaesthesia	1
Sedative	1
Patent medicines	1
Alcohol	8
Belladonna	1
Ether	1
Formaldehyde	1
Morphine	2
Nitrous oxide	1
Opium	2
Potassium permanganate	1
Quinine	1
Sulphuric acid	1
Heredity	3
Variation	3
Variant	1
Acquired traits	1
Hereditary traits	5
Inherited disease	1
Inherited insanity	1
Defective strains	1

Table III. (cont.)

	Frequency of occurrence
Sterilization	3
Heritage	3
Long-selected heritage	1
Characters	1
Dominate	1
Recessive	1
Cross	1
Hybrids	6
Hybridists	1
Mendel's Law	1
Albinism	1
Color-blindness	1
Identical twins	1
Plant genetics	1
Eugenics	1
Eugenists	1
Evolution	2
Paleontology	1
Fossils	2
amber	2
Human evolution	1
Archaeology	2

Table III. (cont.)

	Frequency of occurrence
Prehistoric animals	2
Brontosaurus	1
Extinction	1
Apes	1
Anthropoids	1
Primitive man	3
(Human animal)	1
Neanderthal man	1
Pygmies	1
Primitive instincts	1
Paleozoic	1
Pleistocene	2
Natural selection	1
Animals	1
Sponges	1
Jellyfish	1
Slugs	1
Snails	1
Earthworms	1
Spiders	2
House centipedes	1
Insects	1

Table III. (cont.)

	Frequency of occurrence
Fishes	2
Aquarium	1
Spawn	1
Goldfish	1
Catfish	1
Trout	1
Salmon	1
Amphibia	2
Tadpoles	1
Frogs	1
Reptiles	2
Snakes	3
fangs	1
diamond-back rattler	1
pythons	1
Alligators	3
Birds	3
Mammals	1
Vampire bats	1
Rodents	1
red squirrels	1
prairie dogs	1
rabbits	1

Table III. (cont.)

	Frequency of occurrence
rats	1
guinea pigs	1
Bears	1
grizzly bears	1
Raccoons	1
Canines	1
wolves	1
coyotes	2
Felines	1
lions	5
tigers	3
leopards	2
Hyenas	1
Hippopotamus	1
Deer	2
Reindeer	1
Elk	1
Bison	1
Gazelle	1
Camel	1
Llama	1
Giraffe	1

Table III. (cont.)

	Frequency of occurrence
Zebra	1
Rhinoceros	1
Elephants	3
Whales	1
ambergris	1
Monkeys	5
baboons	2
Apes	2
gibbons	1
orang-utans	2
chimpanzees	1
gorillas	1
Animal reservations	1
Game preserves	1
Fish and game commission	1
Insects	6
Entomology	5
Entomologist	3
Metamorphosis	2
Insect eggs	1
Larvae	2
caterpillars	1

Table III. (cont.)

	Frequency of occurrence
grubs	1
cutworms	1
Chrysalis	1
Antennae	1
Breathing pores	1
Insect pests	2
Chewing insects	1
Sucking insects	1
Insecticides	1
contact poisons	3
stomach poisons	1
fumigants	1
Bordeaux mixture	1
Pyrethrum	2
Silver fish	1
Roaches	3
Grasshoppers	1
Crickets	1
Termites	1
Lice	3
Bedbugs	3
Leaf hoppers	1
Plant lice	3

Table III. (cont.)

	Frequency of occurrence
Scale insects	1
oyster-shell scale	1
Beetles	3
grain beetles	1
aster beetles	1
weevils	1
corn borers	1
iris borers	1
Moths	1
flour moths	1
clothes moths	1
Cabbage worms	1
Fleas	3
Gnats	1
Ants	7
Worker ants	1
Disease-carrying insects	1
Flies	2
Fly prevention	1
Mosquitoes	1
Mosquito prevention	1
Bees	1

Table III. (cont.)

	Frequency of occurrence
Birds	6
Ornithology	1
Values of birds	1
Bird banding	1
Bird reservations	1
Migration	1
Migrants	1
Irregular visitants	1
Bird houses	2
Bird shelters	1
Bird nests	2
Ostriches	1
Birds of paradise	2
Mallard ducks	1
Canadian wild geese	1
Vultures	3
Scavengers	1
Eagles	1
Hawks	2
Henhawks	1
Pheasants	1
Quails	1
Protective coloration	1

Table III. (cont.)

	Frequency of occurrence
Cranes	1
Doves	1
Owls	1
Great horned owls	1
Phoebes	1
American magpies	1
Blue jays	1
Canada jays	1
Crows	3
Blackbirds	1
Orioles	1
Baltimore orioles	1
Pine grosbeaks	1
Crossbills	1
Goldfinches	1
Chipping sparrows	1
Juncos	1
Cardinals	1
Tanagers	1
Northern shrikes	1
Catbirds	1
Chickadees	1
Robins	1

Table III. (cont.)

Plants	Frequency of occurrence
Botany	1
Botanist	1
Horticulture	1
Plant nurseries	3
Greenhouses	1
Hot-beds	3
Cold frames	3
Arboretum	1
State parks	1
Reservations	1
Plant growth	2
Annuals	8
Biennials	2
Perennials	12
hardy perennials	1
Seeds	7
seed coats	1
germination	1
flats	2
tampers	1
seedlings	1

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Table III. (cont.)

	Frequency of occurrence
Roots	3
Root system	1
Rootlets	1
Capillary action	1
Root stems	1
Aerial roots	1
Flowers	12
Stamens	1
anthers	1
pollen	1
Pistil	1
stigma	1
style	1
seed pods	1
Petals	1
Plant-breeding	1
cross-fertilize	1
hand-pollination	1
hybrids	2
Composites	2
Plant pests	2
Plant diseases	2
Bacterial leaf spot	1

Table III. (cont.)

	Frequency of occurrence
Crown rot	1
Bud blight	1
Rust	1
Mildew	1
Soil	1
Acidity	1
Lime	2
Nitrogen	1
Potash	1
Yeast plants	1
Fermentation	1
Molds	1
Ferns	2
Maidenhair fern	1
Conifers	4
Leaders	1
Terminal buds	1
Turpentine industry	1
Resins	1
Forest conservation	1
Reforestation	1
Hardwood trees	3

Table III. (cont.)

	Frequency of occurrence
Shrubs	9
Vegetative reproduction	1
Cuttings	4
Tip-rooting	1
Grafting	1
Priming	3
Boxwood	1
Flowering dogwood	1
Elderberry	1
Forsythia	1
Privet	1
Rhododendron	1
Snowdrop	1
Spireas	1
Sumach	1
Viburnums	1
Weigela	1
Vines	11
Bittersweet	1
Boston ivy	1
Clematis	1
Dutchman's pipe vine	1
English ivy	1

Table III. (cont.)

	Frequency of occurrence
Grapevine	1
Honeysuckle	1
Wisteria	1
Woodbine	2
Bulbs and tubers	8
Crocuses	4
Daffodils	2
Dahlias	1
Gladiolus	1
Hyacinths	1
Irises	2
Jonquils	1
Tulips	2
Wild flowers	1
Anemones	1
Azaleas	1
Columbines	1
Daisies	1
Golden rod	1
Jack-in-the-pulpit	1
Laurel	1
Shad	1
Gardens	2

Table III. (cont.)

	Frequency of occurrence
Old-fashioned gardens	1
Desert gardens	1
cacti	2
Herb-gardens	1
mint	1
pennyroyal	1
tansy	1
thyme	1
Rock gardens	2
Garden flowers	1
Chrysanthemum	1
Cosmos	1
Heliotrope	1
Lilies	3
Morning glory	1
Pansies	2
Peonies	1
Petunias	2
Snapdragons	2
Weeds	4
Sorrel	1
Purslane	1
Fighting the billboards	1

Table III. (cont.)

	Frequency of occurrence
History	
Aristotle	1
Burbank	1
Curie, Madame	1
Koch	1
Pasteur	1
Walton, Izaak	1
General	
Theory	4
Open-mindedness	3
Inter-relations of plants, animals and the inorganic	3
Parasites	1
Host	1
Saprophytes	1
Environment	2
Habitat	1
Hibernation	1
Aquatic	1
Law of averages	1

Chapter V.

School Use of the Popular Magazine's Biological Articles

Classroom biology has much to gain from a selective use of this popular form of biological article. But, beset with many resources, we often fail to adequately employ the more valuable ones; and it seems to be the case that the majority of general-biology teachers have not sufficiently realized the potentialities of this material properly handled.

Some of these articles are written by experts in their special fields, people who are far better informed on those topics than the average general-biology textwriter could be. They may deal with important subjects more intensively or extensively than do the books at the students' command. Or they may deal with topics not found in texts but of obvious values to living. All of them are practical and written in an interest-holding manner.

The biology instructor who forms the habit of keeping in touch with these sources will soon find accruing to him direct values. His professional background will be broadened through acquisition of knowledge new to him, knowledge new to the field and new points of view. His increased value as a teacher should

soon be measured by invigoration of pupil-interest. Perhaps the greatest gain is an intangible one - a greater grasp of the subject and the ability to handle it more forcefully, attained through keeping a firm hold on objectives while reading and thinking.

The reading will be more obviously evidenced by practical applications of biological principles in the form of brief summaries of articles, data with sources, or mere mention and references to acquaint the students with the available range of biological reading-matter.

This leads to another value. How can a teacher hope to awaken in the pupils an interest in reading and to properly guide in the reading-habit formation, unless he, himself, evidences the possession of this quality and habit, unless he is familiar with that which he would have the pupils read? It seems that the most effective impetus toward voluntary reading is given in indirect - or seemingly indirect - ways, such as: by example; by little informal talks with a student or small groups; by looking over an article together and discussing its points of interest, perhaps comparing with another author's statements; by encouraging class use of knowledge gained through reading; and by being quick to recognize a pupil's "erudition".

Although extraneous to this discussion and, perhaps, unnecessary, the following statement intrudes.

All general-biology teachers should be conversant with certain class and educational publications, also certain very excellent little publications gotten out by several biological supply companies; and biology teachers need not scoff at reading the magazines on nature, - such magazines are exactly what they need.

> "For some time there has been a distinct trend toward the placing of more emphasis upon nature study in all biological work. - Biology teachers are coming to realize that they are not training their students for college science courses but for living." [1]

In the bibliography are listed the class and educational, as well as advertising publications, which the author has found most useful.

If the teacher decides to make a personal collection of clippings and pictures, he must decide on some simple, effective device for classifying and indexing or the collection will be as fruitful as the miser's riches.

Before considering how the student can make use of the popular biological articles, we must decide what

1 "What Should a Biology Teacher Know About Natural History?" Turtox News, June 1931. p. 43

values we expect him to gain through their use. The following appears to be a conservative list of aims:

1) A greater respect for the subject through added understanding of its scope and values in life
2) Increased ability to find practical applications of the biological principles
3) Information of direct value in life activities
4) Cultivation of interests
5) Some knowledge of magazine-sources of information and the ability to locate needed information
6) Habits of selective and effective reading

From the school point of view, the popular-magazine biological articles may be classed under three headings: 1) unfit for class use, 2) for current consideration, 3) of more lasting value. The latter articles should be bound, filed and indexed for ready reference; and, unless the magazine is of the type which should be preserved intact, it is better to remove the article and bind it as an entity. In some cases it is advisable to procure several copies to bind for class or group use; and the united efforts of class and parents will provide plenty of such material.

Methods of use depend to some extent on the pur-

pose; in general, the articles of classes 2) and 3) will be used: to promote interests, to develop appreciations, to give some information or understanding, or to develop abilities. The purpose and application of the article will determine whether it should be used by individual, group or class. For instance, a good way to develop an appreciation or an interest in a student is to leave him with a well-written article on the subject, but this article may not appeal to someone else; also such writings lose their values in the retelling so they are not good material for reports.

Informative articles may be of value to the entire class. This is managed by having enough copies, by reports and by use of the bulletin board. I have had made some hand bulletin-boards which may be removed from their hooks for comfortable consultation.

The informative article on some avocational, vocational or special health topic may apply only to one of two individuals.

Pupils should be encouraged to form the habit of looking for this material and selectively reading. Some, they will bring to the teacher for current or future use,-some may be saved for their notebooks. I find it helpful to set aside short periods of time for current biology.

Certain articles form nuclei for group or individual project work; and much of the material, if properly indexed, will aid in simple "research work". The student of high-school level should be taught how to find material from indexes and bibliographies, how to select pertinent portions, and how to classify. A teacher who has not yet taken graduate work may not prove an intrepid guide, but it is time that he should qualify himself. Waples and Tyler offer Research Methods and Teachers' Problems. This book is listed in the bibliography.

Ingenious teachers will find ways that the articles can be used in written work and tests. This leads to the mention of the illustrative material. Some of the pictures from real photographs are of considerable educational value. These should be mounted and indexed. Some form good test material; some help develop various attitudes and are good for bulletin-board display. The students will tend to "see" the bulletin board if they aid in its decoration. Intersperse brief articles and pictures, leaving sufficient margins and with attention to appearance as a whole. After the board is arranged, make certain by various devices that it is consulted. Change the items often.

A few general suggestions conclude this chapter:

1) Encourage the habit of keeping in touch with popular-magazine biology.
2) Teach pupils to notice who the authors of the articles are.
3) Gradually teach selectivity in regard to material.
4) As far as possible, keep the reading voluntary. Do not check on assigned reading too conspicuously
5) Talk readings over in an informal way, encouraging class contributions, and showing approval when it is deserved.

Chapter VI.

Summary

The general biology course should aim to make life more worth living. Therefore, the instructor will frequently need to check his objectives and subject matter by practical criteria variously obtained.

The results of this study offer one such criterion embodied in Table II., page 19 and Table III., page 27. The study is based on a careful consideration of the non-fiction articles of three issues each of the twelve popular magazines having the greatest total distributions in January 1931 [1].

Of the one hundred and fifty-two non-fiction articles, fifty-three were non-biological and ninety-nine were biological in nature. Study of the latter articles resulted in Table II. (already referred to) which is a classified frequency list of the authors' objectives, each objective followed by the main topics used. A summary of the objectives and their frequencies follows:

1)	Health protection and health building	52
2)	Public welfare	14
3)	Understanding of environment	8

1 See Table I., p. 8

4)	Improvement of the environment	19
5)	Understanding of how to raise and care for plants and a knowledge of common varieties of cultivated flowers, bulbs, vines and shrubs	20
6)	Interest in environment	8
7)	Worthy use of leisure time	10
8)	Plant and animal conservation	5
9)	Understanding of common insect-pests and knowledge of their means of control	7

For school use these objectives should be reworded in terms of permanent abilities, habits and attitudes.

Table III. is a classified frequency list of the biological terms found in all the non-fiction articles considered, and is suggestive of the detailed biological subject matter and the biological terminology needed by the general public. The following terms showed the greatest frequencies:

bones	nerves	colds
muscles	decay	energy
stomach	infection	vitamines
blood	bacteria	seeds
heart	fatigue	flowers
brain	nervousness	

Thus, Tables II. and III. form a criterion against

which the instructor can check his objectives, topics, detailed subject matter and choice of terminology.

Chapter V. deals with the school use of certain biological articles of the popular magazines - their values and methods of use.

In the bibliography, in addition to the magazines on which the study is based, are listed books and periodicals which have proven invaluable and are recommended to the biology instructor.

Appendix

Biological Terms From the Non-Fiction Articles of a Cross-Section of the Twelve Leading Popular Magazines [1]

I. The American Magazine

A. March 1931

1) Carr, Harry "The Only Unpaid Movie Star", p. 55

elephants heart lion skeletons

2) Cooper, Courtland Ryley "When Animals Escape", p. 174

elephant felines monkeys
Nubian lion seeds tigers

3) Crowell, James R. "What Your Banker Knows About You", p. 44

brain innate
mule deer (animal) reservations

4) Durant, Will "How to Widen Your World", p. 42

death decay growth
heart insanity paralysis
reproduction tubercle bacilli nitrogen cycle

5) Flagg, James Montgomery "When It Comes to Neighbors", p. 53

diamond back rattler fever gastric
goiter goldfish heart
hen hawk hibernate liver
lungs smallpox typhoid

1 See page 7

ague blood pressure

6) Harrington, Mildred "All Dressed Up", p. 71

bird of paradise ostrich spire

7) Kerby, Philip "Smart Folks Are Easy to Fool", p. 50

bone mental defectives

mind perspiration

8) Robinson "What's the Good Word?", p. 36

ambergris boll weevil energy lotus

lymph nerve paleontology paranoia

9) Sadler, William S. "Are You Committing Suicide on the Installment Plan?", p. 73

acidity	alcohol	alkalinity
animal cells	asthma	belladonna
calcium	cells	debility
diabetes	ductless glands	energy
fatigue	goiter	hay fever
inoculation	liver	morphine
nerves	neuresthenia	opium
organs	organism	protein
quinine	red blood cells	rickets
self poisoning	starch	thyroid gland
tooth	toxin	yeast plants

10) "Can You Turn Your Back on Your Mistakes?", p. 30

blood pressure canker dormant inbred

B. April 1931

11) Chesterton, G. K. "A Job You Wouldn't Want", p. 61

instinct	paralysis
nervousness	open-mindedness

12) Crowell, Merle "Where Do I Get Off?", p. 62

cave man	energy	primitive instincts
reproduction		self-preservation

13) Gould, Bruce "Winged Terror", p. 20

alcohol	brain	stimulants

14) Layfield, James "How to Move Ahead While Standing Still", p. 43

bear	biceps	blood
deer	coyote	elk
	mountain lion	

15) McGeehan, W. O. "But They Do Come Back", p. 53

artery	guinea pig	breathing	ribs

16) Mullett, Mary B. "He Started at the End of His Rope", p. 35

bird reservations	blackbirds
Canadian wild geese	frogs
instincts	Mallard ducks
muscles	nerves
neuritis	

C. May 1931

17) Clark, Neil M. "They Said He'd Never Dance Again", p. 50

alcohol	bone	dislocation
fracture	muscles	skull
	tongue	

18) Dutton, William S. "A New Box of Wonders", p. 22

disease organisms	flies	formaldehyde
living tissue	mosquitoes	resins
	Vitamin D	

19) Horne, I. Sherman "I Fear the Cowards Most", p. 55

apes	brain	chimpanzee
doves	elephant	fangs
fish and game commission		gibbon
grizzly	human animal	instinct
leopard	lion	orang-utan
python	reptiles	snakes
	tiger	

20) Miley, Cora "Overnight Millions", p. 15

elms	honeysuckle	insects	narcotics

21) Rowell, Hugh Grant "How to Get Your Money's Worth From Your Doctor", p. 76

acidosis	diabetes	diphtheria

drugs first aid immunization
patent medicines sinuses smallpox

22) Rutledge, Archibald "Ever Go Stale?", p. 68
alligators open-mindedness
Pasteur seeds snakes

23) Sparkes, Boyden "He Can Answer Any Question", p. 63
brontosaurus evolution fish
fossils lice whale habits

II. Colliers

A. May 16, 1931

24) Courtney, W. B. "Circumstantial Evidence", p. 10
archaeological blister blood bones
decay rabbit skeleton teeth

25) Foster, Freling "Keep Up With the World", p. 30
abdominal birds buffalo
camel insects llama
orchids reindeer vampire
yak zebu

26) Ridenour, Ruth "Never Bet On An Even Chance", p. 25
cold-blooded instincts mind
nerves quail skull

B. May 23, 1931

27) Cooper, Courtney Ryley "All in the Family", p. 20
collar bone death extinction fatigue

fractured pain rheumatic vitamines

28) Foster, Freling "Keep Up With the World", p. 49

insulin narcotics morphine opium

29) Rice, Grantland "Alligator Boy", p. 10

alligators amphibian aquatic inherent

muscular pygmies reptile saurian

C. May 30, 1931

30) Buck, Frank "Discord in Paradise", p. 10

American magpie birds birds of paradise

blood brain crane

crow lion parrot

snake species tiger

31) Dickson, Harris "Fighting City", p. 20

alligators amphibians bubonic plague buzzard

catfish crow cypress disease

epidemic fleas germs heart

instinct malaria monkeys mosquitoes

propagation quarantine rats rodents

32) Foster, Freling "Keep Up With the World", p. 61

feeble-minded skulls sterilization

33) Rice, Grantland "Club Swinging", p. 26

hawk immune nerve strain nervous

III. <u>The Cosmopolitan</u>

A. March 1931

34) Glass, Montague "It Was Practically Nothing", p. 37

abdominal	alcohol	anaesthetic
bacteriological		bacteriologist
blood		disinfectant
eagle		gallstones
gastric	infected	muscular
nerve		nitrous oxide
oxygen	ulcer	senses
spinal anaesthesia		spinal column
	tonsils	

35) Hunt, Frazier "A Boy From Brooklyn Adopts An Old Spanish Custom", p. 50

blood	bone	fainted
heart	muscle	nerves
	spine	

36) Anonymous "I Know They Gave Me Another Woman's Baby", p. 25

abnormal	blood	delirium
diseases	environment	epidemic
hereditary traits	heredity	influenza
Law of averages	natural instincts	nervous
neurasthenic	pneumonia	sedative

D. April 1931

37) De Casseres, Benjamin "From Our Own Life", p. 43

alcoholic	bird	blood
brains	breathe	cell
death	diseased	germs
heart	instinct	instinctively

perennially	physiology	reflex action
scavengers		theory

E. May 1931

38) Hannagan, Steve "He Got What He Wanted", p. 47

adolescence	archaeology	instincts

IV. <u>The Delineator</u>

A. March 1931

39) Batchelder, Esther Lord "Let's Begin With Our Own Children", p. 58

blood	calories	deafness
digestion	disease	germs
liver	malnutrition	minerals
nervous	nutrients	proteins
teeth		vitamines

40) Gruenberg, Benjamin C. "Every Child Is Himself", p, 38

characters	dominate	environment
fatigued	heredity	identical twins
malnutrition	nutrition	variation

41) Tarbell, Ida M. "The New Children's Crusade", p. 17

diseased	environment	instinctive
sanitation		subnormal

B. April 1931

42) Batchelder, Esther Lord "Of Interest to You", p. 102

bacteria bone calory cod liver oil
food standards iron molds
nutritive value oxygen plant growth
sterilization vines vitamines
Vitamin A Vitamin C Vitamin D

43) Crane, George W. "Teach Your Child to See", p. 36
bittersweet feeble-minded goldenrod
nervous neurotic pigeon
robin stimuli

C. May 1931

44) Batchelder, Esther Lord "Watch the Iron", p. 85
calories energy iron

45) Phelps, William Lyon "Don't Sleep Through the Summer", p. 9
bird bird's nest bones
brains fat fatigue
germs lower animals vigor

46) Singer, Caroline "Drums and Dancers", p. 14
beetle blood cassava immune
immunity insect spine vultures

V. Good Housekeeping

A. March 1931

47) Booth, Alice "Mary E. Wooley", p. 34
arboretum brains energy
inherited perennially theory

48) Carrier, Willis H. "Making Weather to Order", p. 92

common cold	diseases	germ
membrane		skin

49) Collins, Frederick L. "The Good Old Days", p. 22

adolescent	environment
apoplectic	solar plexus

50) Eddy, Walter H. "Our Daily Iron", p. 116

anemia	calory	hemoglobin

51) "Dr. Eddy's Question Box"

Colds	colon	digestion
digestive fluids	inoculation	infection
oxidation	stomach	tonsils
toxic		Vitamin A

52) Frazer, Elizabeth "Getting to the Top", p. 28

acquired traits	nervous
brains	inherent
open-minded	species

53) Jewett, Hibbard J. "Gardens", p. 120

annuals	bluebird	crocuses
daffodils	iris	lilacs
lilies	old-fashioned flowers	
peonies	perennials	rock gardens
seeds	Shasta daisies	shrubs
tulips	varieties	vines
	wild flowers	

54) Kenyon, Josephine Hemingway "Why Children Are Thin", p. 113

abdomen	calcium	chronic disease
environment	fatigue	malnutrition
muscles		"ptosis"

55) Marshall, Edison "The Most Thrilling Night of My Life", p. 37

amber	bison	bones
brain	cactus	canines
coma	coyote	fats
fossils	gazelles	giraffes
gnu	hyena	jackal
leopard	lion	mammals
monkeys	muscle	nerves
rhinoceros	sinew	vitality
vocal chords	vulture	zebra

56) O'Kane, Walter Collins "Preventing Damage by Moths", p. 90

ants	bedbugs	chrysalis
contact poisons	entomologist	fleas
insects	life history (insect)	
moths	pyrethrum	roaches
	toxic	

57) Taylor, Demetria M. "Meals for the Children", p. 88

bones	digestion	good posture
malnutrition		teeth

B. April 1931

58) Eddy, Walter H. "Let the Women Write the Label", p. 103

Food and Drugs Act McNary-Mapes Amendment
nutritive starch
tongue

59) "Dr. Eddy's Question Box", p. 134

asthma fats gall bladder
government inspection of meats
hay fever nervousness pollen

60) Kenyon, Joseph Hemenway "Have You a Problem Child?", p. 112

acidosis adolescence
anemia fever
glands infection
mind pituitary gland
sinus infection thyroid gland

61) O'Kane, Walter Collins "Invaders of the Pantry", p. 96

ant antennae bedbug
contact poisons flour moths grain beetles
house fly insect eggs larvae
pyrethrum roach termites
toxic worker ants

62) Stimson, Philip Moen "Give Your Child Health", p. 118

abdomen	acquired immunity
body tissue	bony structure
chest	cold
contagious diseases	Dick test
digestion	diphtheria
German measles	inherited immunity
inoculation	measles
natural immunity	Schick test
scurvy	toxin-anti-toxin
vaccination	

63) Sulzer, Marjorie Norrell "A Pocket Handkerchief Garden", p. 129

annuals	bees	cosmos
earthworms	morning glory	perennials
petunias	snapdragons	weeds

64) Williams, Henry Smith "Dressing Dangerously", p. 32

bird house	bird shelter
blue bird	blue jay
bobolink	Canada jay
cardinal	catbird
chickadee	chipping sparrow
color-blind	crossbill
crows	goldfinch

great-horned owl
hawks
irregular visitants
junco
migrant birds
northern shrike
orioles
owls
phoebe
pine grosbeak
prolific
protective coloration
red squirrel
tanagers

C. May 1931

65) Booth, Alice "Grace Abbott", p. 50

inheritance
jonquils
snapdragons
tuberculosis
tulips

66) "Dr. Eddy's Question Box", p. 110

blood
blood pressure
calories
digestive fluids
food values
heart
hydrochloric acid of the stomach
mineral salts
ulceration
proteins
pulse
varicose veins
veins
vitamines
Vitamin A
Vitamin B
Vitamin C

67) Kenyon, Joseph Hemenway "Acidosis", p. 106

absorption
acidosis
alkaline
body fatigue
blood
blood tissues
carbohydrates
communicable disease

diarrhea
fats
fevers
foci of infection
headache
lymph
tongue
tonsilitis
tonsils

68) O'Kane, Walter Collins "The Clan That Bites and Annoys", p. 98

amber
ants
bedbug
crickets
disease
dysentery
flea
fly prevention
fumigant for bedbugs
gnats
house centipede
insecticides
malaria
metamorphosis
mosquito prevention
roach
silver fish
toxic
typhoid
yellow fever

69) Rinehart, Mary Roberts "My Story", p. 56

jack-in-the-pulpit
junipers
lilies
nerves
neurotic
rhododendrons
roots (plant)
tulips

70) Solberg, Lorena Daniel "Making a Garden of the Back Yard", p. 73

annuals
azaleas
clematis
crocus
daffodils
dogwood
evergreen
gladiolus
hardy perennials
lilacs
mountain laurel
pansies
rhododendron
shrubs
varieties

71) Theiss, Lewis Edwin "Let's Go Some Place", p. 36

forest conservation redwoods

reservations state parks national parks

72) Williams, Henry Smith "My Educated Orioles", p. 42

Baltimore orioles bird banding

hickory human evolution

inherited instincts

orchid ornithology

maple migration

natural selection nest

spruce Virginia Creeper

VI. Ladies' Home Journal

A. March 1931

73) Baker, S. Josephine "Some Problems of Childhood", p. 130

abdomen left-handedness

adenoids body resistance

bronchitis cod-liver oil

common cold diabetes

eyestrain germ

headache infections of the respiratory tract

insulin treatment lack of resistance

mouth-breathing nutrition

pneumonia tonsils

sneezing Vitamin A

Vitamin D

74) Bush-Brown, Louise "Flower-Garden Pests", p. 139

aphids	aster beetle	beetles
bird value	Bordeaux mixture	
breathing pores (insect)		cabbage worms
caterpillars		chewing insects
chlorophyll		contact poisons
cutworms		diseases (plant)
grasshoppers	grubs	insect pests
iris borer	leaf hoppers	plant lice
parasites	saprophytes	rose beetle
rust fungi	scale insects	slugs
stomach poisons		sucking insects

75) deKruif, Paul "Toward the White Plague's End", p. 8

antiseptic	B. C. G. (tuberculosis vaccine)
bile	brains
consumption	diphtheria
fever	glands
immune	immunity
Koch	lungs
meningitis	monkey
pasteurized milk	pneumonia
small pox	toxin-anti-toxin
tuberculosis	ulcer
vaccination	vaccine
veins	virulent

White plague

76) Rockwell, F. F. "New Bulbous Irises", p. 19

bulbous irises	crocuses	evergreens
hybrids	plant lice	rock garden
shrubs	species	varieties

77) Simpson, Jean "The Trays For the Sick Room", p. 114

albuminized	calories	cellulose	colds
fever	lactose	stimulants	stomach

78) "Editorial Page"

alcohol (harms of)	blood pressure
blood vessels	communicable diseases
diphtheria	drugs
epidemics	health service
heart	immunization
kidneys	liver
nervous system	pasteurization
scarlet fever	septic sore throat
typhoid	

79) "Notes For Busy Gardeners", p. 140

conifers	evergreen	leaders
lime	perennials	pines
pruning	apruces	terminal buds

B. April 1931

80) Bush-Brown, Louise "The Spring Garden Clinic", p. 180

bacteria	bacterial leaf spot

bud blight	bulbs
cutworms	infected
iris	iris-borers
larvae	mildew
mite	moles
oyster-shell scale	peonies
rhizome	root rot

81) Ueland, Brenda "Why Marriage Is Happy", p. 3

adolescent	cutaneous
digestive fluids	energy
germs	paleolithis
Pavlov	prehistoric
self-preservation	variations

82) Schling, Max "Hearts and Flowers", p. 18

cold frames	dahlias
ferns	heliotrope
hyacinths	maiden hair fern
rhododendrons	shrubs
snapdragons	variety

weigela

83) Wright, Richardson "Climbing Roses", p. 21

families (plant)	hybrid	hybridists
perpetuals	plant pests	pruning
	snail	

C. May 1931

84) Bush-Brown, Louise "Your Garden in Summer", p. 150

aphids	bacterial rot

broad-leaved evergreens	capillary action
crown rot	infected
insect diseases	insect pests
irises	mildew
perennials	phlox
red spiders	rust disease
snapdragons	weeds

wildflowers

85) Fox, Helen M. "A Garden of Herbs", p. 154

annuals	biennials	cold frame	cuttings
evergreens	germinate	herbs	hot bed
mint	pennyroyal	perennial	purslane
sorrel	tansy	thyme	weeds

86) Mitchell, Sidney B. "Breeding Bearded Irises", p. 25

albinism	anther
bees	crosses
cross-fertilize	irises
Mendel's law	plant genetics
pollen	recessive characters
seedlings	seed pod
stigma	studs
style	variety

87) Rockwell, F. F. "Vines For Comfort", p. 24

bittersweet	Boston ivy	Dutchman's-pipe vine
English ivy	evergreens	grapevine

pruning spring bulbs vines
wisteria woodbine

VII. Liberty

A. May 16, 1931

88) Benchley, Robert "Future Man", p. 55
ape elephant jellyfish
Neanderthal Man Paleozoic
Pleistocene Age sponges
tadpole theory

89) Kropotkin, Princess Alexandra "To the Ladies", p. 38
instincts forest conservation mumps
reforestation scarlet fever

90) St. John's, Adela Rogers "Lon Chaney", p. 28
blood energy heart
nervous organs

91) Editorial "Serious Educational Defects", p. 4
assimilated breathing health-building
organ reproduction stomach

B. May 23, 1931

92) St. Johns, Adela Rogers "Lon Chaney", p. 36
muscles nerves spine

93) Editorial "Are We For Prohibition?", p. 4
alcoholic stimulation blood brain
stomach

C. May 30, 1931

94) St. Johns, Adela Rogers "Lon Chaney", p. 36

bird house	blood transfusion
death	headaches
heart	infection
Izaak Walton	lungs
spine	tonsils

trout

95) Editorial "The Gangster", p. 4

heritage	monster	spawn
tentacles		wolves

VIII. The Literary Digest

A. May 16, 1931

96) "A Chemical Breath-Smeller", p. 18

alcohol ether potassium permanganate

sulphuric acid

97) "Dangers of Birth Control", p. 24

infections	neurologists	neuroses
pelvic	psychiatrists	vein

98) "Health at Every Street Corner", p. 18

arteries neon light nervousness toxic

99) "How Canada Keeps Country Doctors", p. 26

contagious diseases	diphtheria
immunization	scarlet fever
smallpox	typhoid fever

B. May 23, 1931

100) "Blood Permits Required in New York", p. 29

blood transfusion	iso-agglutinins
syphilis	

101) "Explosive Anaesthetics", p. 28

anaesthesia	ether	hiccup
nitrous oxide	oxygen	pathologist

102) "Sterilization of Criminals"

brain	defective strains
eugenics	eugenists
feeble-minded	hereditary insanity
inheritance	inherited diseases
imbeciles	sterilization

C. May 30, 1931

103) "A Tree That Strangles Its Friends", p. 27

aerial roots	prehistoric animals	annual
banyan	bird	cypress
host	palm	roots
rubber tree	seed	species
	vine	

104) "How to Pick a Doctor", p. 27

first aid	laryngitis	stomach
resistance		intestines

105) "Prohibition Goes to College", p. 11

brain	intoxication
theory	unprejudiced thinking

IX. McCall's

A. March 1931

106) Ditmars, Raymond L. "Men and Monkeys", p. 22

anthropoids	ape	baboon
beaver	chimpanzee	evolution
gorilla	monkey	orang-utan
prairie dog	prehistoric man	quadruped
raccoon	species	spider

107) Gillaspie, Beulah V. "Milk", p. 68

acid	alkaline
butter fats	calcium
casein	coagulate
digestible	epidemics
health protection	milk-borne epidemics
pasteurization	sterilization
unpasteurized	

108) MacKenzie, Ellen "Notes From My Diary", p. 128

cold germs	colds
disease	energy
growth	membranes of nose and throat
rickets	ultra-violet rays

109) McCollum, E. V. "Our Daily Diet", p. 36

auto-intoxication	chronic diseases
decomposition	energy foods
fermentative	germ
intestinal bacteria	minerals
nervous	putrefactive bacteria
therapeutic value	

110) Shaw, Ellen Eddy "Beauty Hints For Gardens", p. 122

How to plan color combinations

111) Shaw, Ellen Eddy "How To Furnish A Nursery for Baby Plants", p. 130

annuals	flat	perennials
roots	seedlings	seeds
	tamper	

B, April 1931

112) Gillaspie, Beulah V. "Sugar", p. 71

beet sugar	corn sugar	dextrose
cane sugar		sucrose

113) Hart, Frances Noyes "Pigs in Clover", p. 28

birds	blood	chestnut
cypress	energy	ferns
oaks	pine trees	turpentine industry
	salmon	

114) Miller, Laura Parks "Vacationing in Your National Park", p. 108

To help people find a worthy use of leisure time

115) Shaw, Ellen Eddy "Garden Adventures", p. 132

acidity of soil	aquarium	begonias	cactus
desert gardens	ferns	hyacinths	lime
nitrogen	phosphorus	potash	wild flowers

C. May 1931

116) Canfield, Dorothy "What Home Can Do For A Child", p. 36

infection instinct organisms

117) Free, Montague "For Your Rock Garden", p. 30

ivy mint perennial rock garden

sedums seeds spiders toadflax

118) Gillaspie, Beulah V. "Eggs", p. 40

calcium digestion fat

iron nervousness phosphorus

rickets scurvy Vitamin A

Vitamin B Vitamin C Vitamin D

119) Mercein, Eleanor "Derby Day", p. 24

blood long-selected heritage

crossed roaches

120) Miller, Laura Parks "Vacationing in Your National Park", p. 58

wild flowers columbine

121) Shaw, Ellen Eddy "Let's Begin to Plant", p. 78

Directions for planting seeds

X. Pictorial Review

A. March 1931

122) Coolidge, Emelyn L. "March Winds and Babies", p. 44

breathing bronchitis

colds coughs

disease germs	infection
infectious diseases	influenza
lowered resistance	measles
pneumonia	scarlet fever
whooping cough	

123) Kift, Jane Leslie "Make Way For Spring", p. 59

annuals	cannas	flats
forsythia	germinate	hot bed
hybrid	perennials	propagate
prune	pussywillows	root system
seedlings	shrubbery	snowdrops
varieties	vines	weigela

124) Seabury, Florence Guy "Exclusively For Women", p. 13

anatomical	ants	bees
germs	insects	spiders
theory		

B. April 1931

125) Coolidge, Emelyn I. "The Two Kinds of Croup", p. 42

breathing	catarrhal croup
cold	cough
diphtheria of the larynx	fever
indigestion	membranous croup
Schick test	sun baths
temperature	toxin-anti-toxin

windpipe

126) Thompson, Dorothy "At the Court of King Gustaf", p. 17

bacilli	blood
evergreens	Madame Curie

(interrelations of plants and animals)

C. May 1931

127) Ashley, Doris Lee "Guides of Youth", p. 42

abscesses	acne
adolescent	alcohol
anaemia	antiseptics
blood circulation	fat glands
hair follicles	infection
pores	pus
scalp	sebaceous glands
skin	sterilized

128) Coolidge, Emelyn L. "May-Day Reminders", p. 50

abnormality	bones	diphtheria
germs	gums	infectious diseases
inoculations	mucous membranes	organs
posture	smallpox	sun baths
teeth	toxin-anti-toxin	vaccination

129) Gale, Zona "The Child in the House", p. 26

human system	lifting muscles
muscular equipment	'our savage descent'

reasoning area

130) Kift, Jane Leslie "Kitchen Gardening", p. 47

flats	hot bed	
intensive cultivation		minerals
nutritive properties		rootlets
roughage	seeds	shrubs
tree-roots	vitamines	weeds

131) Stillman, Paul R. "Teeth Need Exercise", p. 52

arterial blood	blood vessels	bone
calcium	capillaries	caries
function	infected	involuntary
minerals	muscles	phosphorus
primitive man	pulp	phorrhea
tissues	veins	Vitamin C
voluntary		waste products

XI. Woman's Home Companion

A. March 1931

132) Better Babies Bureau "Better Babies", p. 158

antiseptic	bones	cod liver oil
disease	rickets	teeth
	tuberculosis	

133) Cades, Hazel Rawson "Rest Yo'self", p. 118

brains	chronic colds	circulation
dermatologists	energy	facial muscles
fatigue	mind	nerves
stomach		vertebrae

134) Dennett, Roger H. "The A. B. C. of Eating", p. 31

acidosis	beri-beri
digestive disturbances	fatigue
germ	indigestion
infectious diseases	nutrition
nutrients	pellagra
puberty	scurvy
tooth decay	vigor

Vitamins A, B, C, D, F, G, H

135) Tabor, Grace "Shrubs in the Garden", p. 47

azaleas	elderberry
evergreens	flowering dogwood
graft	hybrid
seeds	shad bush
shrubs	spireas
sumach	tip-rooting

viburnums

B. April 1931

130) Dennett, Roger H. "What We Know About Contagion", p. 15

abscesses	asthma	blood serum
boils	chicken pox	chronic bronchitis
coagulate	common cold	contagious diseases
diphtheria	disease	erysipelas
germ	glands	grippe
immunized	inflammation	inherited
inoculation	lungs	malignant

mastoids	measles	mumps
muscle	pneumonia	serum
sinus infection	smallpox	streptococcus
toxin-anti-toxin	tuberculosis	typhoid fever
ultra-violet rays	vaccination	vaccines
vein	vitamines	virus

137)Editorial, p. 4

adolescent	Aristotle	cancer
diphtheria	energy	epidemics
heart diseases	influenza	measles

138)Nichols, Nell B. "Feeding the Family in April", p. 92

assimilated	digestive system	energy
fatigue	liver	muscular
nutrition	Vitamin A	vitamines

139)Richardson, Anna Steese "A Letter and Its Lesson", p. 24

contamination	flies	inspected milk
pure water		septic tanks

140)Tabor, Grace "Flowers and More Flowers", p. 45

annual	biennial	botanically
columbines	crocus	disease (plant)
flax	growth	horticulturally
hybrids	iris	pansies
perennials	phlox	shrubberies
side-crown buds	snapdragons	species
roots		root-stem

141) Tabor, Grace "Start Them Early", p. 93

cold frame green house hot bed

seeds perennials

C. May 1931

142) Better Babies Bureau "Better Babies", p. 144

meningitis tuberculosis

143) Grulee, Clifford G. "Summer's Coming In", p. 12

asthma bacteria

contagion decomposition of food

digestive tract diarrhea

diseases dysentary

functioning of skin gastro-intestinal diseases

germs hay fever

infections organism

perspire serums

ultra-violet rays variation

vitality vitamines

water pollution

144) Montgomery, Mabel "A Church Planting Job", p. 123

boxwood cannas cuttings

nursery (plant) prune

145) Tabor, Grace "Flowers Seen As Individuals", p. 90

anemone chrysanthemums compositae

cross-fertilization daisy

laurel lily petals

pistils pollen pollen cases

poppy	seed	stamens
stigma		tubers

146) Wright, Laura "A Progressive Garden Show", p. 118

cuttings	old-fashioned flowers	privet hedges
plant nursery		pruned
rock garden	shrubbery	trimmings

147) Anonymous "This Long Disease, My Life", p. 23

astigmatism	blood	bodily functions
cancer	carbuncles	chiropractor
chronic	colds	colon
death	diet	disease
elimination	energy	epidemic
eyes	fever	focal infection
grippe	intestinal	kidney
lesion	malady	mind
muscles	nervous system	organs
osteopath	osteopathy	pneumonia
reflexes	stomach	spine
teeth	tumor	vertebrae
	wisdom tooth	

XII. The Saturday Evening Post

A. May 2, 1931

148) Blythe, Samuel G. "Taming the Wild Guarjule", p. 28

botanist
cortex
evolutionary products
glands
hop vine
plant nursery
rootlets
sap (plant)
shrub
vegetative reproduction
vine
cellular tissue
cuttings
germinate
habitat
physiological
propagate
rubber
seed coats
strains
weeds

149) Editorial "Saving Water", p. 24
forest conservation
interrelations of the organic and inorganic
relation of width of tree rings to climactic change

150) Roberts, Kenneth "The Scenery Wreckers", p. 25
epidemic
How Europe is fighting the billboard
nerve
perfumes (flower)

B. May 9, 1931

C. May 16, 1931

151) Hall, Wilbur "Amateur Plant Breeding" (From unpublished manuscripts and notes left by Luther Burbank), p. 141
bees
beetles
composites
cross-pollination
fertility

hand-pollinating	heredity
hybrids	natural pollination
organs	plant breeding
pollen	pistils
seed envelopes	stamens
variant	variation
variety	weeds

152) Smith, Winford H. "The Family Doctor"

abdominal	adenoids
bacteriologists	blood test
bubonic plague	cardiac
cholera	clinic
dental hygienists	diabetes
diseased tonsils	electrocardiograph machines
high-calory diet	high-protein diet
infection	tonsils
typhus	yellow fever

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